The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A biomaterial, comprising a biocompatible polymer scaffold defining an array of pores, wherein substantially all the pores have a similar diameter, wherein the mean diameter of the pores is between about 20 and about 90 micrometers, wherein substantially all the pores are each connected to at least 4 other pores, and wherein the diameter of substantially all the connections between the pores is between about 15% and about 40% of the mean diameter of the pores.

2. The biomaterial of Claim 1, wherein the mean pore diameter is between about 30 and about 40 micrometers.

3. The biomaterial of Claim 1, wherein the biocompatible polymer scaffold is biodegradable.

4. The biomaterial of Claim 1, wherein the biocompatible polymer scaffold is a hydrogel.

5. The biomaterial of Claim 1, wherein the biocompatible polymer scaffold comprises 2-hydroxyethyl methacrylate.

6. The biomaterial of Claim 1, wherein the biocompatible polymer scaffold comprises poly(ε-caprolactone) dimethylacrylate.

7. The biomaterial of Claim 1, wherein the biocompatible polymer scaffold comprises collagen.

8. The biomaterial of Claim 1, wherein the biocompatible polymer scaffold comprises silicone rubber.

9. The biomaterial of Claim 1, wherein the biomaterial has a thickness of at least 70 micrometers.

10. An implantable device, comprising a layer of a biomaterial, wherein the biomaterial comprises a biocompatible polymer scaffold surrounding an array of monodispersed pores, wherein substantially all the pores have a similar diameter, wherein

the mean diameter of the pores is between about 20 and about 90 micrometers, wherein substantially all pores are each connected to at least 4 other pores, and wherein the diameter of substantially all the connections between the pores is between about 15% and about 40% of the mean diameter of the pores.

11. The implantable device of Claim 10, wherein the layer of biomaterial has a thickness of at least 70 micrometers.

12. The device of Claim 10, wherein the device comprises a device body, wherein the layer of biomaterial is attached to the device body.

13. The device of Claim 12, wherein the layer of biomaterial is attached to the outer surface of the device body.

14. The device of Claim 12, wherein the device is a medical device.

15. A method for forming a biomaterial, comprising the steps of:

(a) forming a biocompatible polymer scaffold around a template comprising an array of monodisperse porogens, wherein substantially all the porogens have a similar diameter, wherein the mean diameter of the porogens is between about 20 and about 90 micrometers, wherein substantially all porogens are each connected to at least 4 other porogens, and wherein the diameter of substantially all the connections between the porogens is between about 15% and about 40% of the mean diameter of the porogens; and

(b) removing the template to produce a porous biomaterial.

16. The method of Claim 15, wherein the porogens are spherical beads.

17. The method of Claim 15, wherein the porogens comprise poly(methyl) methacrylate.

18. The method of Claim 15, wherein the biocompatible polymer scaffold comprises 2-hydroxyethyl methacrylate.

19. The method of Claim 15, wherein the biocompatible polymer scaffold comprises poly(ε-caprolactone) dimethylacrylate.

20. The method of Claim 15, wherein the biocompatible polymer scaffold comprises collagen.

21. The method of Claim 15, wherein the biocompatible polymer scaffold comprises silicone rubber.

22. The method of Claim 15, wherein the biomaterial has a thickness of at least 70 micrometers.

23. The method of Claim 15, wherein step (a) comprises forming the template by packing the porogens into a mold and fusing the porogens to form the connections between the porogens.

24. The method of Claim 23, wherein the porogens are fused by sintering.

25. A method for promoting angiogenesis in and around an implantable biomaterial, comprising the step of implanting a porous biomaterial, wherein the biomaterial comprises a biocompatible polymer scaffold surrounding an array of pores, wherein substantially all the pores have a similar diameter, wherein the mean diameter of the pores is between about 20 and about 90 micrometers, wherein substantially all pores are each connected to at least 4 other pores, and wherein the diameter of substantially all the connections between the pores is between about 15% and about 40% of the mean diameter of the pores.